TEST PROCEDURE

TP 712D	
Title Quick Check Coastdowns	**Page Number** 1 of 12
Originator Dan McBryde, Quality Analyst	**Supersedes** TP 712C
Responsible Organization Vehicle Testing (VT)	**Computer Program** None Required
Type of Test Report None Required	**Data Form Number** NA
Report Distribution Vehicle Programs & Compliance Division Representative, Manufacturer's Representative, and Requesting Program Office	**Implementation Date** 10-23-95

Implementation Approval

Test Procedure Authorized by EPCN #103

Revision Description

The purpose of this change is to revise the procedure as described in EPCN #164.

Note: Specific brand names in EPA/EOD procedures are for reference only and are not an endorsement of those products.

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1. Purpose

The purpose of this procedure is to determine the time required for a test vehicle at a given horsepower and inertia weight setting to coast down from 55 mph to 45 mph on a twin-roll hydrokinetic chassis dynamometer.

This information determines the forces acting on the vehicle and is used to verify the manufacturer's alternate horsepower settings.

2. Test Article Description

Light-duty vehicles scheduled for Certification Fuel Economy testing at the Environmental Protection Agency (EPA), National Vehicle and Fuel Emissions Laboratory (NVFEL) using alternate horsepower settings, and vehicles scheduled for the Dynamometer Power Absorption (DPA) confirmation test.

3. References

3.1 Mobile Source Air Pollution Control (MSAPC) Advisory Circular No. 55C, December 12, 1986

3.2 Memo, J. M. Marzen, June 6, 1979, Subject: "Dynamometer Quick Check and DPA Value Determination Procedure for Vehicles that are not Tested For Emissions"

3.3 Memo, Daniel P. Heiser, December 20, 1985, Subject: "Change in Procedure for the Second Determination of Quick Check Times after a Quick Check Failure at EPA"

3.4 EPA current safety policies

4. Required Equipment

4.1 Form 708-01, "Vehicle Test Data Sheet" (see TP 708)

4.2 Chassis dynamometer (dyno)

Equipment used: Clayton ECE-50 with a power absorption unit to simulate the road load power and flywheels to simulate the vehicle's equivalent test weight.

4.3 Dynamometer roll revolution counter

Equipment used: KLT-Custom fabricated to Testing Services Division (TSD) specifications

4.4 Dynamometer speed-time recording instrumentation, as described in MSAPC Advisory Circular 55C, Attachment II, Section A

4.5 Quick check coastdown timer, wired directly to the dynamometer front roll speed signal

4.6 Dyno Vehicle Restraint System for:

4.6.1 Rear drive type vehicles

Cable winch, permanently affixed to the test cell floor, to restrain the test vehicle horizontally on the dynamometer and minimize vehicle rocking

Equipment used: Little Mule Products Model #B2 Puller Hoist

4.6.2 Front drive type vehicles

Cable winches, permanently affixed to the test cell floor, or anchor hooks attached to the dynamometer frame and tie-down straps to restrain front-wheel drive vehicles on the dynamometer

Equipment used: Little Mule Products Model #B2 Puller Hoist
or Eastern Rotorcraft Corp. Tie-Down Part #SP-4212-1

4.7 Wheel chocks

Equipment used: Clayton or airplane-style chock blocks

4.8 Exhaust Connectors:

4.8.1 Flexible exhaust tubes

4.8.2 Exhaust tube adapters

4.8.3 Clamps

4.8.4 Silicone rubber exhaust connectors

4.8.5 Gaskets and boot assembly

Equipment used: All the above are fabricated to meet TSD requirements; see Facility Support Branch (FSB) blueprint file drawings TO4 88B-(0-11)

4.9 Fixed-speed cooling fan with a capacity not exceeding 5,300 cubic feet per minute (cfm). Additional or special cooling fans may be used if approved in advance by Vehicle Programs and Compliance Division or the appropriate Task Officer.

Equipment used: Hartzell Fan Model #N24-DUWS

4.10 Video Driver's Aid (VDA) System:

4.10.1 Data Acquisition Microcomputer
Equipment used: Macintosh Plus Model #M0001A with Relax Technology 45 Megabyte Hard Disk Drive Model #C46668

4.10.2 Video Monitor

Equipment used: Electrohome Electronics Model #38-V19NWB-AP

4.10.3 Data Acquisition Device

Equipment used: Taurus Model IDAC 2000

4.10.4 Laboratory Network System (LNS)

Equipment used: Items fabricated to TSD specifications

4.10.5 Printers

Equipment used: Apple LaserWriter
Hewlett-Packard Laser Jet

4.10.6 File Server Software

Equipment used: Apple Computer's Appleshare

4.11 Test Cell Ambient Monitoring System: Type "J" thermocouple and temperature/millivolt transmitter, or thermocouple thermometer connected to a strip chart recorder, or to the Test Analysis Processor (TAP)

Equipment used: Leeds and Northrop Temperature/Millivolt Transmitter, Model #Centry 479

Omega Engineering Thermocouple Thermometer, Model #199

Strip Chart Recorders:
Soltec, Model #33112-2 or #3316-6
Hewlett-Packard, Model #7132A

4.12 Printing Calculator

5. Precautions

5.1 Care must be taken to ensure that the vehicle transmission is placed in neutral when performing coastdowns. Vehicle braking must not occur during the coastdown.

5.2 The power switch on the quick check coastdown timer must be in the "ON" position at all times.

5.3 If the coastdowns are not within tolerance, the roll brake must not be engaged prior to verification of the dyno horsepower.

6. Visual Inspection

All visual inspections are incorporated into the procedure.

7. Test Article Preparation

7.1 Within 1 minute following completion of the driving schedule, start the Quick Check Coastdown sequence.

If the Quick Check Coastdown sequence is not performed within this time limit, the vehicle must be operated over two 765-second Highway Fuel Economy Driving Schedules.

7.2 The ambient temperature encountered by the vehicle at all times during this procedure must be within 68-86 °F.

7.3 Vehicles that do not receive preconditioning or emission testing must soak for a minimum of 4 hours at an ambient temperature within 68-86 °F. The start of the soak period begins after the vehicle has been inspected and the tires inflated to the test pressure. The soak period will allow the vehicle and tires to stabilize sufficiently to ambient conditions and permit accurate adjustment of the tire pressure prior to the start of the Highway Fuel Economy Driving Schedules.

7.4 Verify that the vehicle is connected to the dyno and the necessary test equipment is set up. It is not necessary to connect the test vehicle exhaust system to the CVS. Use the exhaust scrubber system (accessed through the test cell floor) provided on each site. Do not collect or analyze exhaust samples.

8. Test Procedure

Unless otherwise specified, the following operations are performed by the test driver:

101 Verify that the correct warmup procedure has been completed.

102 Verify that the cooling fan(s) specified for the highway test is (are) on. If the vehicle exhaust system is connected to the CVS, ensure that the blower power is on.

103 Verify that the "MANUAL-AUTOMATIC" switch on the quick check coastdown timer is in the "AUTOMATIC" position and that the power is on. The power should remain on at all times.

If the power is not on, turn it on before starting the warmup Highway Fuel Economy Driving Schedule or at least 15 minutes prior to performing quick check coastdowns.

104 Accelerate the vehicle at the approximate rate of 2 mph per second to a speed between 64-66 mph (target speed is 65 mph). Maintain this speed for a minimum of 2 seconds. Verify that the quick check coastdown timer is reset to 0.00 seconds.

105 Carefully shift the transmission into neutral and allow the vehicle to coast down.

If the vehicle is equipped with a manual transmission, the clutch must be engaged after shifting into neutral. The throttle must be released and the brakes must not be applied. The coastdown timer will automatically record the time required for the vehicle and dynamometer system to freely decelerate from 55 mph to 45 mph.

106 Using the edit function on the Video Driver's Aid (VDA) system, record the time displayed on the coastdown timer in the "Comments" section of the VDA Summary Report.

107 Repeat Steps 104 through 106 twice more, for a total of three coastdowns.

If the difference between the maximum and minimum time of the three coastdowns exceeds ±0.3 seconds, repeat Steps 104 through 106 once or twice, as needed (perform no more than five coastdowns), until the difference between the maximum and minimum time of the three coastdowns is less than or equal to ±0.3 seconds.

If this time requirement can not be met, write "Coastdowns are not within 0.3 seconds" in the "Comments" section of Form 708-01 and notify the VT senior technician.

108 Stop the vehicle.

109 If more than one combination of three coastdown times are within 0.3 seconds, average the first three coastdown times that are within this time frame.

110 Record the duration in seconds (XX.XX) for each of these three coastdown times on Form 708-01, Cards J, K, or L.

111 Record the quick check coastdown timer equipment tracking identification number on Form 708-01, Cards J, K, or L.

112 Leave the vehicle on the dynamometer and the vehicle restraint system connected.

113 Use a printing calculator to obtain the average coastdown time by adding the three coastdown times and dividing the sum by three.

114 Multiply the manufacturer's target coastdown time listed on the Vehicle Specification Report by 1.07 and by 0.93. Compare the average coastdown time with the manufacturer's target coastdown time according to Step 115, 116, or 117.

115 If the average coastdown time is more than the product of 0.93 times the manufacturer's target coastdown time and less than the product of 1.07 times the manufacturer's target coastdown time, enter the average coastdown time on Form 708-01, Card B, Columns 71-74.

Example 1: Average coastdown time = 10.50

Manufacturer's target coastdown time = 10.00

$10.00 * 0.93 = 9.30$

$10.00 * 1.07 = 10.7$

In this example, the average coastdown time is greater than the manufacturer's target coastdown time multiplied by 0.93 and less than the manufacturer's target coastdown time multiplied by 1.07. In this example, the horsepower does not need to be verified and the technician would proceed to Step 118.

116 If the average coastdown time is equal to or greater than the product of 1.07 times the manufacturer's target coastdown time, immediately accelerate the vehicle up to 50 mph and verify that the horsepower is within ±0.2 hp of the indicated horsepower.

Example 2: Manufacturer's target coastdown time = 10.00

Average coastdown time = 10.70

10.00 * 1.07 = 10.70

In this example, the average coastdown time is equal to or greater than the manufacturer's target coastdown time multiplied by 1.07. The horsepower will need to be verified as described above.

If, after verification, the horsepower was not within ±0.2 hp of the indicated horsepower, do not engage the dyno roll brake or remove the vehicle restraint system. Immediately notify the Calibration & Maintenance (C&M) senior technician.

If, after verification, the horsepower was within ±0.2 hp of the indicated horsepower, notify the Vehicle Programs & Compliance Division representative. If the Vehicle Programs & Compliance Division representative is not available notify the VT senior technician.

117 If the average coastdown time is less than or equal to the product of 0.93 times the manufacturer's target coastdown time, immediately accelerate the vehicle up to 50 mph and verify that the horsepower is within ±0.2 hp of the indicated horsepower.

Example 3: Manufacturer's target coastdown time = 10.00

Average coastdown time = 9.30

10.00 * 0.93 = 9.30

In this example, the average coastdown time is less than or equal to the manufacturer's target coastdown time multiplied by 0.93. The horsepower will need to be verified as described above.

If, after verification, the horsepower was not within ±0.2 hp of the indicated horsepower, do not engage the dyno roll brake or remove the vehicle restraint system; immediately notify the C&M senior technician.

If, after verification, the horsepower was within ±0.2 hp of the indicated horsepower, notify the VT senior technician.

118 Remove the vehicle from the dynamometer as follows:

Disconnect the vehicle exhaust system from the CVS or floor exhaust dump.

Disconnect the restraint system, including wheel chocks, from the vehicle.

Engage the dynamometer roll brake by pressing the red button on the dyno control panel.

Close the vehicle engine compartment cover so that it is fully latched and move the cooling fan(s) out of the way.

Drive the vehicle off the dyno.

9. Data Input

9.1 The driver enters all coastdown times performed on the VDA Summary Report.

9.2 The driver records all coastdown times and the quick check coastdown timer equipment tracking identification number on Form 708-01, Cards J, K, or L.

9.3 The driver uses a printing calculator to average the three coastdown times that are within 0.3 seconds.

The average value is entered on Form 708-01, Card B, Col. 71-74 and the calculator printout is stapled to the Highway Test VDA Summary Report.

10. Data Analysis

10.1 The technician averages the results of three valid coastdown times and compares the result to the manufacturer's target time.

10.2 The following steps are performed by a validating technician who is familiar with this procedure and has not performed any of the preceding steps.

10.2.1 Verify that the numbers used to average the coastdown times are the same as those displayed on the VDA Summary Report. Verify that the driver used the correct grouping of values if more than three coastdowns were performed.

10.2.2 Average the three values used and verify that the same average is obtained and was correctly transcribed onto Form 708-01, Card B, Cols. 71 - 74.

10.2.3. Verify that the coastdown times were correctly transcribed onto Form 708-01, Cards J, K, or L.

11. Data Output

11.1 Form 708-01

11.2 Calculator printout attached to the VDA Summary Report for Highway Test

12. Acceptance Criteria

12.1 The Quick Check Coastdown test must start within 1 minute of the end of the "Highway Fuel Economy Test."

12.2 The following acceptance criteria must be met prior to the start of this procedure:

12.2.1 Ambient temperatures encountered by the test vehicle must remain within 68-86 °F at all times.

12.2.2 The dyno inertia simulation must be set to the exact inertia value specified for the vehicle on the "Vehicle Specification Report."

12.2.3 The dyno loading must be set to the exact indicated horsepower.

12.2.4 The dynamometer must be warmed according to CFR 86.135.

12.3 A total of three (of a possible five) coastdown times must be within 0.3 seconds for the coastdown data to be valid.

12.4 The horsepower must be verified to within ±0.2 hp of the indicated horsepower if the average coastdown time is either of the following:

Equal to or greater than the product of 1.07 times the manufacturer's target coastdown time.

Less than or equal to the product of 0.93 times the manufacturer's target coastdown time

13. Quality Provisions

13.1 If five coastdowns are performed and three are not within 0.3 seconds, the statement "Coastdowns are not within 0.3 seconds" is recorded in the "Comments" section of Form 708-01.

13.2 The average of the three coastdown times entered on Form 708-01 is verified by an independent technician.

13.3 The average quick check coastdown time is checked to determine if it is more than 0.93 times, and less than 1.07 times the manufacturer's target coastdown time